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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the ink jet printing equipment equipped with the ink feeder and this equipment which supply ink to an ink jet print head.

[0002] Here, the application to these is possible for this invention including all various information processors or the printer as the output machine including the ink grant to all the ink base materials that receive various kinds of ink grants, such as cloth, yarn, paper, and a web material, as a print.

[0003]

[Description of the Prior Art] Conventionally, if an ink jet printing equipment is divided roughly, it will be kicked an exception by that with which the print head and the ink stores dept. were united as a cartridge, and the thing installed separately. The former will be obliged to exchange of the whole cartridge containing a still usable print head, if the ink of a stores dept. is consumed while it can miniaturize. Enlargement of an ink stores dept. is possible for the latter because of separate installation, and it is suitable for the print of abundant number of sheets. This invention carries out ink supply at any time by exchanging ink cartridges etc. to an ink stores dept. (ink tank) about the latter.

[0004] By the way, in case ink cartridges are exchanged, a foreign matter may invade in an ink tank from the exterior. After sampling the ink cartridge consumed especially from an ink feeder and leaving it as it is, the ink not only invasion of a foreign matter but in an ink tank dries and thickens, or has solidified. For example, if the diameter of a delivery of the print head which has the print consistency of 400dpi is very as detailed as about 20 micrometers and it is got blocked also with few foreign matters in a nozzle, the poor regurgitation will be produced and a desired image will no longer be obtained.

[0005] To such faults, a filter is prepared in the ink passage to a delivery, and technique collected before a foreign matter reaches a print head with this filter is proposed and put in practical use.

[0006] Generally, with an ink jet printing equipment, in order to remove the dust which adheres to an ink delivery front face in order to prevent the poor regurgitation of ink, paper powder, or the thickening ink in a nozzle, an ink booster pump is used; the foreign matter in a nozzle is discharged outside, and regurgitation recovery action of the print head which flushes a delivery front face is performed.

[0007] However, if blinding has arisen in the filter, the ink welding pressure to a print head will be insufficient, only neither the thickening ink on the front face of a delivery nor the flow rate which flushes paper powder etc. will be obtained, but regurgitation bounce-back capability will decline remarkably. Moreover, ink may be made to thicken in the print head which flow resistance is large when the filter is carrying out blinding, although self-supply of the ink consumed during a print of a print head is carried out by the capillarity of a nozzle, supply stops meeting the deadline, inhales air, and carries out the regurgitation of the ink, using heat energy further in producing the poor regurgitation \*\*\*\*, or it may burn, and may damage.

[0008] Furthermore it not only produces breakage of an image defect or a print head, but when the filter carried out blinding, ink \*\* between a filter and a pump went up, ink leaked from the connection section of ink passage, and un-arranging [ which carries out ink contamination ] had produced the inside of a

plane.

[0009] Moreover, at the time of insertion of an ink cartridge, or balking, the ink adhering to an ink outlet might fall and ink contamination of an ink feeder or the inside of a plane might be carried out.

[0010]

[Problem(s) to be Solved by the Invention] The purpose of this invention prevents invasion of the dust to an ink feeder, removes the blinding of a nozzle or a filter, and is to offer [ the print condition by which the print head over a long period of time was stabilized, and ] the ink feeder which can maintain regurgitation bounce-back capability.

[0011] Moreover, other purposes are at the time of exchange of an ink cartridge to offer the ink jet printing equipment equipped with the ink feeder and this equipment which can prevent ink contamination for the ink dropped from the ink outlet of a cartridge by reception and absorbing.

[0012]

[Means for Solving the Problem] The ink stores dept. which stores the ink which should be supplied to a print means to have an ink delivery for invention of claim 1 to breathe out and print ink to a recorded material in order to attain the above-mentioned purpose, The ink cartridge which connotes the ink which should connect with opening of this ink stores dept. free [ attachment and detachment ], and should be supplied to said ink stores dept., A lock means to engage with said ink cartridge and to forbid balking of said ink cartridge in case this ink cartridge connects with said ink stores dept., In case engagement for this lock means solves and said ink cartridge secedes from said ink stores dept., it is characterized by having a closure means to close said opening.

[0013] attachment and detachment of said cartridge are interlocked with, the arm which carries out constant-rate migration is interlocked with further at migration of this arm, until [ out of range ] evacuation migration carries out in the migration locus of said cartridge including the cap which opens and closes said opening from the location where said cap closes said opening by initiation of connection actuation with said opening of said cartridge, and it may make said closure means return to a closure location by balking of said cartridge in claim 1 here Moreover, in claim 2, the ink droplet which falls from the ink outlet of said ink cartridge on the occasion of balking of said ink cartridge may be prepared in reception and the absorbent to absorb by the cap of said closure means.

[0014] A print means to receive ink supply from the ink feeder and this ink feeder of a publication may be included in claim 1 thru/or one term of 3. In claim 4, said print means may have the electric thermal-conversion object which generates the heat energy which makes said ink produce film boiling as a component which generates the energy made to use in order to carry out the regurgitation of said ink.

[0015]

[Function] In this invention, invasion of the dust to an ink feeder can be prevented by the closure means, the blinding of a nozzle or a filter can be prevented, the fall of regurgitation bounce-back capability can be prevented, and the print condition by which the print head over a long period of time was stabilized can be maintained.

[0016] Moreover, by the absorbent prepared in a part of above-mentioned closure means, the ink droplet which falls at the time of attachment and detachment of an ink cartridge can be absorbed, and ink contamination of an ink feeder etc. can be prevented.

[0017]

[Example] Hereafter, the example of this invention is explained to a detail with reference to a drawing.

[0018] (The 1st example) Drawing 1 is the sectional view of the printing equipment by this invention, and the cutter with which the body of a printing equipment and 2 cut printed material with the long picture-like roll as printed material, and 1 cuts 4 by predetermined die length, the conveyance roller of a pair with which 3 and 5 convey printed material in the conveyance direction, respectively, and 6 are vertical-scanning rollers which carry out conveyance positioning of the specified quantity corresponding to the print width of the below-mentioned print head for printed material correctly. Of the above configuration, the conveyance path of the printed material supplied from a roll 2 is formed.

[0019] The printed material which the cassette by which 7 stocks the printed material of the letter of a cut, and 8 are the guide sections which guide and convey printed material, and was conveyed from the

cassette 7 joins a conveyance path from the above-mentioned roll 2 just before the conveyance roller 5. 9 is the carriage which has the below-mentioned print head ( drawing 1 un-illustrating), and is supported by horizontal-scanning rail 9a of a pair movable in the drawing top depth direction. 10 is a platen in the location which counters on both sides of carriage 9 and printed material, and it has suction adsorption means (illustration abbreviation), such as suction by Ayr, or an electrostatic fixing disc, in order to prevent that printed material contacts a print head while preventing the float of the printed material under print further and maintaining at a flat surface.

[0020] Drawing 2 is the partial perspective view showing typically the structure of the ink discharge part of the above-mentioned print means (print head) 30. A print head 30 is an ink jet print means which carries out the regurgitation of the ink using heat energy, and is equipped with the electric thermal-conversion object for generating heat energy. Moreover, the print means 30 prints by making ink breathe out from a delivery using the pressure variation produced by growth of the air bubbles by film boiling produced with the heat energy impressed with said electric thermal-conversion object, and contraction. In drawing 2, two or more deliveries 32 in a predetermined pitch are formed in the delivery forming face 31 which sets the printed material 2 and a predetermined gap (for example, about about 0.5-2.0mm), and meets, and 35, such as an exoergic resistor as an electric thermal-conversion object for generating the energy for ink regurgitation along with the wall surface of each liquid route (nozzle) 34 which connects the common liquid room 33 and each delivery 32, is arranged in it. In this example, a print head 30 is the physical relationship to which a delivery 32 is located in a line in the migration direction (main scanning direction) of carriage 9, and the crossing direction, and is carried in this carriage 9. In this way, the electric thermal-conversion object 35 which corresponds based on a picture signal or a regurgitation signal is driven (energization), film boiling of the ink in a liquid route 34 is carried out, and the print head 30 which makes ink breathe out is constituted from a delivery 32 by the pressure then generated.

[0021] Next, the surrounding configuration of a print head is explained with reference to drawing 3.

[0022] Carriage 9 is equipped with print head 30C corresponding to cyanogen, a Magenta, yellow, and black, 30M, 30Y, and 30BK. 11 is the ink supply system (or ink feeder) which supplies ink to this print head 30C, 30M, 30Y, and 30BK, and is equipped with ink cartridge 11C corresponding to cyanogen, a Magenta, yellow, and black, 11M, 11Y, and 11BK. With a non-illustrated pump, ink is supplied to print head 30C, 30M, 30Y, and 30BK through tube 12C, 12M, 12Y, and 12BK. 13 is the pulse motor which carries out the scan drive of the carriage 9 in a main scanning direction (illustration longitudinal direction), and drives carriage 9 through the pulley 14 fixed to this motor 13, a pulley 15, and a belt 16. 17 drives the ink supply system 11 through the driving pulley 18 which is the motor which carries out a scan drive in a main scanning direction (illustration longitudinal direction), and is fixed to this motor 17 in the ink supply system 11 synchronizing with carriage 9, a pulley 19, and a belt 20.

[0023] 2 is printed material, such as paper of the above-mentioned shape of a roll, and the letter of a cut, and is conveyed in the direction of drawing Nakagami with the conveyance roller 5 and the vertical-scanning roller 6. 23 is a carriage member in the location for performing processing (regurgitation recovery being called hereafter) for removing the factor which reduces image grace. The nozzle side of print head 30C, 30M, 30Y, and 30BK is covered by this carriage member 23, and the ink regurgitation by the drive of a print head or ink discharge by pressurization is performed from a print head nozzle in this condition. Furthermore, by introducing a high-speed flow in the cap member 23 in a print head nozzle side, and blowing away the residual ink accompanying the above-mentioned ink regurgitation, dust, fluff, etc. from a nozzle side according to this air current, a nozzle side is cleaned and the non-regurgitation and regurgitation nonuniformity are removed.

[0024] With reference to drawing 1 and drawing 3, a series of usual print printing sequences are explained. In drawing 1, by the printed material detection sensor (un-illustrating) by which the printed material conveyed from the roll 2 or the cassette 7 is located just before the conveyance roller 5, if printed material is detected, the roller conveyance roller 5 and the vertical-scanning roller 6 of a conveyance path will be conveyed until the tip of the specified quantity, i.e., printed material, results in the vertical-scanning roller 6.

[0025] In drawing 3, if it is conveyed until the tip of the printed material 2 results in the vertical-scanning roller 6, carriage 9 and the ink supply system 11 will be driven to a scanning direction (illustration right-hand side) by motors 13 and 17. With this, print head 30C, 30M, 30Y, and 30BK print with the print width shown as inside L of drawing based on a picture signal.

[0026] After the Rhine print printing, while the return drive of carriage 9 and the ink supply system 11 is carried out to the predetermined location on the left-hand side of illustration, the printed material 2 is correctly conveyed with the vertical-scanning roller 6 corresponding to print width L.

[0027] The printed material 2 is discharged outside the plane after predetermined cycle \*\*\*\*\* in the sequence of the above print printing and printed material conveyance.

[0028] One example of an ink feeder based on this invention is explained using drawing 4. Drawing 4 is a sectional view for explaining arrangement and its configuration of the print head at the time of regurgitation recovery, carriage, and an ink feeder.

[0029] On the carriage 9 which slides on the horizontal-scanning rail 9a top of parallel two mutually, ink cartridge 11c makes desorption free, and fitting and the supporter material (side plates 40 and 41) for being held are set up. Moreover, ink tank 42c for storing the ink supplied from ink cartridge 11c is prepared in carriage 9, and opening with which the ink cartridge inserted from opening of the top plate of carriage 9 projected makes free opening 52c and desorption of ink tank 42c, and fits in. Moreover, on carriage 9, a side plate 41 is adjoined, the base material 46 is set up, and this support plate 46 supports the tubes 45c and 50c prolonged from in KUNTAKU42c to print head 30c. Furthermore, pump 43c which was open for free passage to the ink tank 42 and ink supply tube 45c is arranged at the lower part of carriage 9. This pump 43c also has a thing in order to perform regurgitation recovery which eliminates the delivery 32 of print head 30c, plugging of a nozzle 34, etc. by carrying out pressurization supply of the ink c to print head 30c. In this example, regurgitation recovery action is based on the pressurization circuit system of ink. Moreover, regurgitation recovery action is performed in the location where the print head 30 countered the cap 23, as the broken line of drawing 3 shows. That is, if pump 43c operates, the ink c sent from ink tank 42c will be pressurized, and it will send to ink supply tube 45c from ink outlet 44c. The pressurized ink reaches the ink connection section 51 which passed supply tube 45c and was prepared on the support plate 46. Furthermore, ink is sent to supply tube 12c which made this ink connection section 51 and end open for free passage, and made the other end connect with print head 30c, and the filter 47 which intervenes between the edges of supply tube 12c and the common liquid rooms 33 which have been arranged in print head 30c is passed. The ink which arrived at the common liquid room 33 is discharged into cap 23 while it pressurizes opening of each liquid route (nozzle) 34 shown in drawing 2, and a delivery 32. Dust, thickening ink, etc. which adhered to the delivery side etc. by this are flushed. And it is collected by the lung ink bottle 55. Moreover, some ink passes along a filter 48 and the return tube 49, passes the ink connection section 51 and tube 50c further, and returns from the common liquid room 33 to ink tank 42c.

[0030] Although pump 43c carries out pumping actuation and Ink c is positively sent to print head 30c in the case of regurgitation recovery action, in the usual print actuation, pump 43c is in a idle state. However, the ink consumed with a print is automatically supplied through pump 43c and each tubes 45c, 12c, 50c, and 49 in the condition of having carried out opening, from ink tank 42c by the capillary tube force of the nozzle of print head 30c.

[0031] Subsequently, with reference to drawing 5 and drawing 6, the configuration of the details of ink cartridge 11c is explained.

[0032] The case 60 which connotes Ink c has the height 62 which engages with the level difference section 61 which engages with a lock means to mention later in the outer wall, and a closure means. Furthermore, at the pars basilaris ossis occipitalis of a case 60, it has the cylinder-like ink outlet pipe 63. Having the shaft 64 movable on the same axle in the ink outlet pipe 63, the end has in one the elastic body 65, for example, packing which consists of silicone rubber. The other end is supported by the base material 66 which prevents \*\*\*\* of a shaft. Between a shaft 64 and a base material, it is inscribed in a compression spring 67 by the shaft orientations of a shaft 64, a part of ink outlet pipe 63 contacts packing 65 according to the spring force, and the sealing device of ink is made. The base material 66 of

a shaft 64 is a cylindrical shape, and has two or more openings 68 on the side attachment wall. If the tip (packing 65 side) of a shaft 64 is pushed up against a spring 67, as shown in drawing 6, Ink c will flow out of the inside of a case 60 through the opening 68 of a base material 66, and the passage of the ink outlet pipe 63.

[0033] it is installed inside ink tank 42c, if ink cartridge 11c is set in a feeder as shown in drawing 4 -- it pushes up, and a pin 69 pushes up packing 65 against the energization force of a spring 67, and supplies Ink c in ink tank 42c. If an oil level reaches to the point of the ink outlet pipe 63, ink supply will be interrupted temporarily. If ink is consumed and an oil level falls, the tip of the ink outlet pipe 63 of an ink cartridge will be exposed. If air invades in tubing, as for the ink c within a case 60, only the part will be supplied to outflow and tank 42c. Therefore, the liquid ink side in tank 42c is kept constant.

[0034] Next, the lock means 70 shown in drawing 1 is explained using drawing 4.

[0035] The lock pawl 71 is attached free [ rotation ] focusing on the pivot 73 prepared in the fulcrum 72. Moreover, the tension spring 74 is stretched between the lock pawl 71 and a fulcrum 72, the lock pawl 71 is always counterclockwise energized focusing on a pivot 73, and the posture shown as the continuous line of drawing 4 is maintained. This posture is in the lock condition of ink cartridge 11c. That is, although ink cartridge 11c tends to move up in the stability of the compression spring 67 installed inside ink cartridge 11c, the level difference section 61 of ink cartridge 11c engaged with the lock tiptoe edge 75, and has prevented the migration to the upper part (setting to drawing 4) of ink cartridge 11c. If removal of ink cartridge 11c raises the other end of the lock pawl 71 to a chain-line location, the above-mentioned inclination will be canceled and ink cartridge 11c will break away according to the stability of a compression spring 67.

[0036] On the other hand, although the lock pawl 71 is in the posture shown as this Fig. continuous line at the time of wearing of cartridge 11c, if cartridge 11c is inserted from the upper part, the edge R of cartridge 11c will contact the slant face of the lock pawl 71, and if it pushes in further, the lock pawl 71 will move to a chain-line location against the tension spring 74. And if the level difference section 61 of a cartridge engages with the tip 75 of the lock pawl 71, it will become the completion of wearing.

[0037] Next, a closure means 80 to close opening 52 of ink tank 11c c is explained using drawing 4 and drawing 7.

[0038] If the configuration of the closure means 80 is explained first, the 1st arm 82 is formed in the pivot 81 prepared in the side plate 40 upper part free [ rotation ]. The 1st arm 82 has the gear 83 in one on a pivot 81 and the same axle. The 2nd arm 85 was formed in the pivot 84 furthermore prepared in the side plate 40 free [ rotation ], and the 2nd arm 85 had the gear 86 in one on a pivot 84 and the same axle, and has geared with the gear 83 of the 1st arm 82.

[0039] Moreover, it twists, and a coil spring 87 is stretched between a side plate 40 and the 2nd arm 85, and is always energizing the 2nd arm 85 counterclockwise. The 1st link 91 has a pin 92 at the end, and engages with the 2nd arm 85, and the other end is engaging with the 2nd link 93.

[0040] The cap arm 100 has the cap 101 which closes opening 52 of ink tank 11c c at the end, and is attached in the pivot 102 prepared in the side plate 40 free [ rotation ], and the other end is engaging with the pin 94 prepared in the end of the 2nd link 93. In the 1st link 91, two projections 96 are formed in two slots 95 and the 2nd link, and it can slide along with the 2nd link fang furrow 95 by engagement to these slots 95 and projection 96. Moreover, a spring 97 is stretched between both the links 91 and 93, and it is energizing in the direction which always extends, i.e., the direction which the 1st link 91 and the 2nd link 93 leave mutually.

[0041] Although the 1st and 2nd links 91 and 93 may really be constituted from a member, with the location precision of pivots 84 and 102, or the components precision of the 2nd arm and the cap arm 100 In consideration of the case where the cap arm 100 does not move to a request location, as this example shows to drawing 4, it is distance to the engagement section of the pivot 84 of the 2nd arm 85, and the 1st link pin 92 L1 It carries out. It is the distance to the engagement section of the rotation core 102 of the cap arm 100, and the 2nd link pin 94 L2 It is  $L1 > L2$  when it carries out. It is set up so that it may become. Therefore, the movement magnitude of the direction of the upper part of the 1st link 91 by rotation of the 2nd arm 85 becomes larger than that of the 2nd link 93 which engages with cap 100, and

cap 100 moves to a predetermined location certainly. The difference of movement magnitude is absorbed as an amount of slides of both the links 91 and 93, and a clearance 98 produces it as a result between the slot 95 of the 1st link 91, and the projection 96 of the 2nd link 93.

[0042] Next, actuation of the closure means 80 is explained using drawing 7.

[0043] In the condition that ink cartridge 11c is sampled from the ink feeder, the closure means 80 is closing opening 52 of ink tank 42c with cap 101, as the continuous line of drawing 7 shows.

[0044] It twists, the 2nd arm 85 pulls up the 1st link 91 according to the spring force of a coil spring 87, and the 2nd link 93 further combined with the spring 97 is also pulled up. At this time, as for the cap arm 100 which can be freely rotated focusing on a pivot 102, invasion of the dust from the outside to ink tank 42c, fluff, etc. is prevented [raise / an end] by the cap 101 of the other end maintaining the closure posture of opening 54c, and desiccation prevention of ink is made.

[0045] In the state of the above-mentioned closure, the 1st arm 82 is projected in the insertion-and-detachment locus of ink cartridge 11c. If ink cartridge 11c is inserted from the ink feeder upper part, the height 62 and the 1st arm 82 of ink cartridge 11c will contact first. For example, A1 shown with the chain line. When ink cartridge 11c is inserted to a location, 82 is the 1st arm A2. The cap 101 which rotates to a location and is interlocked with this is A3. It moves to a location and the closure of opening 52c is canceled.

[0046] Cap 101 is A3 even if inserted in the condition of having inclined as an ink cartridge was shown by the chain line S here. It is in a location and does not interfere with the ink outlet 63 of ink cartridge 11c. Furthermore, it is B1. When inserted to a location, it becomes the contact on the side attachment wall of ink cartridge 11c, and the 1st arm 82 instead of contact on a height 62 and the 1st arm 82, and the 1st arm 82 is B-2. 101 is the cap B3 which rotates to a location and is interlocked with the 1st arm 82. It rotates to a location, starts in it and moves to the evacuation location besides the insertion locus of ink cartridge 11c. Furthermore, if ink cartridge 11c is pushed in, as mentioned above, with the lock means 70, ink cartridge 11c will be locked and will become the completion of insertion.

[0047] By the way, as ink cartridge 11c inserted is shown in drawing 4, the circumference of the ink outlet 63 and its wall are filled with Ink c. Ink cartridge 11c is exchanged in response to the signal of having consumed the ink c in ink cartridge 11c by non-illustrated ink residue detection. Even if it is the entire state of the sky at this time, when some ink c has adhered to the wall of the ink outlet 63 and cartridge 11c is sampled, an ink droplet may fall. B1 [namely,] ink cartridge 11c is indicated to be with the chain line when the direction of sampling of ink cartridge 11c explains using drawing 7. A location and A1 if extracted to a location or S location -- the ink droplet of the ink outlet section 63 -- the inside of ink tank 42c from opening 52c -- it falls. If it becomes near the location shown as the continuous line furthermore extracted up, cap 100 will rotate and it will move to a closure location. Then, cap 101 will be located directly under the ink outlet 63, and an ink droplet will fall on cap 101.

[0048] So, in this example, the absorbents 103, such as a porosity member, are allotted to the cap tooth back as area which may carry out ink fall.

[0049] While ink contamination of the cap 101 had been carried out, when it moves to an evacuation location, it is transmitted to the 1st and 2nd adjoining link 91 and 93 and the cap arm 100, and the engagement section with a pivot 102 is permeated. Although each part material may start a malfunction when ink dries, by having set the area which receives ink fall as the cap tooth back, and having formed the absorbent 103 there, ink is collected completely and the contamination to the other sections is prevented.

[0050] (in addition to this) In addition, especially this invention is equipped with means (for example, an electric thermal-conversion object, a laser beam, etc.) to generate heat energy as energy used also in an ink jet print method in order to make the ink regurgitation perform, and brings about the effectiveness which was excellent in the print head of a method which makes the change of state of ink occur with said heat energy, and the printing equipment. It is because the densification of a print and highly minute-ization can be attained according to this method.

[0051] About the typical configuration and typical principle, what is performed using the fundamental principle currently indicated by the U.S. Pat. No. 4723129 specification and the 4740796 specification,



for example is desirable. Although this method is applicable to both the so-called mold on demand and a continuous system On the electric thermal-conversion object which is especially arranged corresponding to the sheet and liquid route where the liquid (ink) is held in the case of the mold on demand By impressing at least one driving signal which gives the rapid temperature rise which supports print information and exceeds nucleate boiling Since make an electric thermal-conversion object generate heat energy, the heat operating surface of a print head is made to produce film boiling and the air bubbles in the liquid (ink) corresponding to this driving signal can be formed by one to one as a result, it is effective. A liquid (ink) is made to breathe out through opening for regurgitation by growth of these air bubbles, and contraction, and at least one drop is formed. If this driving signal is made into the shape of a pulse form, since growth contraction of air bubbles will be performed appropriately instantly, the regurgitation of a liquid (ink) excellent in especially responsibility can be attained, and it is more desirable. As a driving signal of the shape of this pulse form, what is indicated by the U.S. Pat. No. 4463359 specification and the 4345262 specification is suitable. In addition, if the conditions indicated by the U.S. Pat. No. 4313124 specification of invention about the rate of a temperature rise of the above-mentioned heat operating surface are adopted, the further excellent print can be performed.

[0052] As a configuration of a print head, the configuration using the U.S. Pat. No. 4558333 specification and U.S. Pat. No. 4459600 specification which indicate the configuration arranged to the field to which the heat operation section other than the combination configuration (a straight-line-like liquid flow channel or right-angle liquid flow channel) of a delivery which is indicated by each above-mentioned specification, a liquid route, and an electric thermal-conversion object is crooked is also included in this invention. In addition, the effectiveness of this invention is effective also as a configuration based on JP,59-138461,A which indicates the configuration whose puncturing which absorbs the pressure wave of JP,59-123670,A which indicates the configuration which uses a common slit as the discharge part of an electric thermal-conversion object to two or more electric thermal-conversion objects, or heat energy is made to correspond to a discharge part. Namely, no matter the gestalt of a print head may be what thing, it is because it can print now efficiently certainly according to this invention.

[0053] Furthermore, this invention is effectively applicable also to the full line type print head which has the die length corresponding to the maximum width of the print medium which can print a printing equipment. As such a print head, any of the configuration which fills the die length with the combination of two or more print heads, and the configuration as one print head formed in one are sufficient.

[0054] In addition, this invention is effective also when the thing of a serial type like an upper example also uses the print head exchangeable chip type to which the electric connection with the body of equipment and supply of the ink from the body of equipment are attained by the print head fixed to the body of equipment or the body of equipment being equipped, or the print head of the cartridge type with which the ink tank was formed in the print head itself in one.

[0055] Moreover, as a configuration of the printing equipment of this invention, since the effectiveness of this invention can be stabilized further, it is desirable to add the regurgitation recovery means of a print head, a preliminary auxiliary means, etc. If these are mentioned concretely, a preheating means to heat using the capping means, the cleaning means, the pressurization or the suction means, the electric thermal-conversion object, the heating elements different from this, or such combination over a print head, and an auxiliary discharge appearance means to perform the regurgitation different from a print can be mentioned.

[0056] Moreover, although only one piece was prepared also about the class thru/or the number of a print head carried, for example corresponding to monochromatic ink, corresponding to two or more ink which differs in an others and print color or concentration, more than one may be prepared the number of pieces. That is, although not only the printing mode of only mainstream colors, such as black, but a print head may be constituted in one as a printing mode of a printing equipment or the paddle gap by two or more combination is sufficient, for example, this invention is very effective also in equipment equipped with at least one of each of the full color printing mode by the double color color of a different color, or color mixture.

[0057] Furthermore, in addition, in this invention example explained above, although ink is explained as a liquid It is ink solidified less than [ a room temperature or it ], and what is softened or liquefied at a room temperature may be used. Or by the ink jet method, since what carries out temperature control is common as a temperature control is performed for ink itself within the limits of 30 degrees C or more 70 degrees C or less and it is in the stabilization regurgitation range about the viscosity of ink, ink may use what makes the shape of liquid at the time of use print signal grant. In addition, in order to prevent the temperature up by heat energy positively because you make it use it as energy of the change of state from a solid condition to the liquid condition of ink, or in order to prevent evaporation of ink, the ink which solidifies in the state of neglect and is liquefied with heating may be used. Anyway, ink liquefies by grant according to the print signal of heat energy, and this invention can be applied also when using the ink of the property which will not be liquefied without grant of heat energy, such as that by which liquefied ink is breathed out, and a thing which it already begins to solidify when reaching a print medium. The ink in such a case is good for a porosity sheet crevice or a through tube which is indicated by JP,54-56847,A or JP,60-71260,A also as liquefied or a gestalt which counters to an electric thermal-conversion object in the condition of having been held as a solid. In this invention, the most effective thing performs the film-boiling method mentioned above to each ink mentioned above.

[0058] Furthermore, in addition, as a gestalt of this invention ink jet printing equipment, although used as an image printing terminal of information management systems, such as a computer, the gestalt of the reproducing unit combined with others, a reader, etc. and the facsimile apparatus which has a transceiver function further may be taken.

[0059]

[Effect of the Invention] According to this invention, the following effectiveness is acquired as explained above.

[0060] 1) By having established a closure means to close opening of the ink tank which receives ink supply from an ink cartridge, desiccation of ink and invasion of dust can be prevented and the stable print condition over removal and a long period of time for the nozzle of a print head or the blinding of a filter and regurgitation bounce-back capability can be maintained.

2) Since the closure means is constituted so that insertion and detachment of an ink cartridge may be interlocked with and it may operate, it does not need the new driving means for a closure means.

[0061] 3) The ink contamination to the other sections can be prevented by preparing the area and the absorbent which receive the ink fall from an ink cartridge in a closure means (cap).

[0062]

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[Translation done.]